

Report on the Environment

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Coastal Benthic Communities

Benthic communities are largely composed of macroinvertebrates, such as annelids, mollusks, and crustaceans. These organisms inhabit the bottom substrates of estuaries and play a vital role in maintaining sediment and water quality. They also are an important food source for bottom-feeding fish, invertebrates, and birds. Communities of benthic organisms are important indicators of environmental stress because they are particularly sensitive to pollutant exposure (Holland et al., 1987). This sensitivity arises from the close relationship between benthic organisms and sediments—which can accumulate environmental contaminants over time—and the fact that these organisms are relatively immobile, which means they receive prolonged exposure to contaminants in their immediate habitat (Sanders et al., 1980; Nixon et al., 1986).

This indicator reports on the condition of benthic communities based on a comprehensive nationwide program of collecting “grab” samples from the benthic zone and analyzing them in a laboratory to identify and classify the species present. Condition is scored using a benthic community condition index that combines three measures: species richness (i.e., the number of different species present), the diversity of species present, and the relative abundance of types of organisms that exhibit different degrees of tolerance to disturbance (Pelletier et al., 2018). Each site’s benthic community condition receives an index value ranging from 0 to 1, with lower scores indicating degraded conditions and higher scores indicating good conditions. High-scoring sites have a wide variety of species, including low proportions of pollution-tolerant species and high proportions of pollution sensitive species, while lower-scoring sites are less diverse and are populated by more pollution-tolerant species and fewer pollution-sensitive species (U.S. EPA, 2021).

The data for this indicator are from probabilistic surveys conducted as part of EPA’s National Coastal Condition Assessment (NCCA) and presented in EPA’s 2015 National Coastal Condition Assessment Report (U.S. EPA, 2021). The surveys were designed to provide a national picture of coastal benthic community condition by sampling sites in coastal waters throughout the contiguous United States. Comparable data were collected three times: 2005–2006, 2010, and 2015. Data are sufficient to show differences in benthic community condition over time for four regions: Northeast Coast, Southeast Coast, Gulf Coast, and West Coast.

What the Data Show

The West Coast has consistently had the highest benthic community scores, with high condition in 85 percent of coastal area during the most recent time period sampled (Exhibit 1). The Southeast Coast had the largest proportion of coastal area with low condition (11 percent). The Southeast and West Coast benthic community index scores remained relatively stable over time, while scores varied somewhat in the Northeast and Gulf Coast regions. Nationwide, EPA’s 2015 National Coastal Condition Assessment Report concluded that coastal benthic community conditions scores have increased steadily over time (U.S. EPA, 2021). The Gulf Coast had substantial missing benthic data during the 2005–2006 sampling period, due in part to difficulties in obtaining samples after the destructive 2005 hurricane season (Katrina and Rita) (U.S. EPA, 2021).

Limitations

- Comparable data have not been collected over the same timeframes in Alaska, Hawaii, or U.S. territories.
- Sample collection is limited to a four-month period from June through September. Further, because

benthic communities can be strongly influenced by episodic events, this indicator may not reflect the full range of conditions that occur at each sampling location throughout this time period.

Data Sources

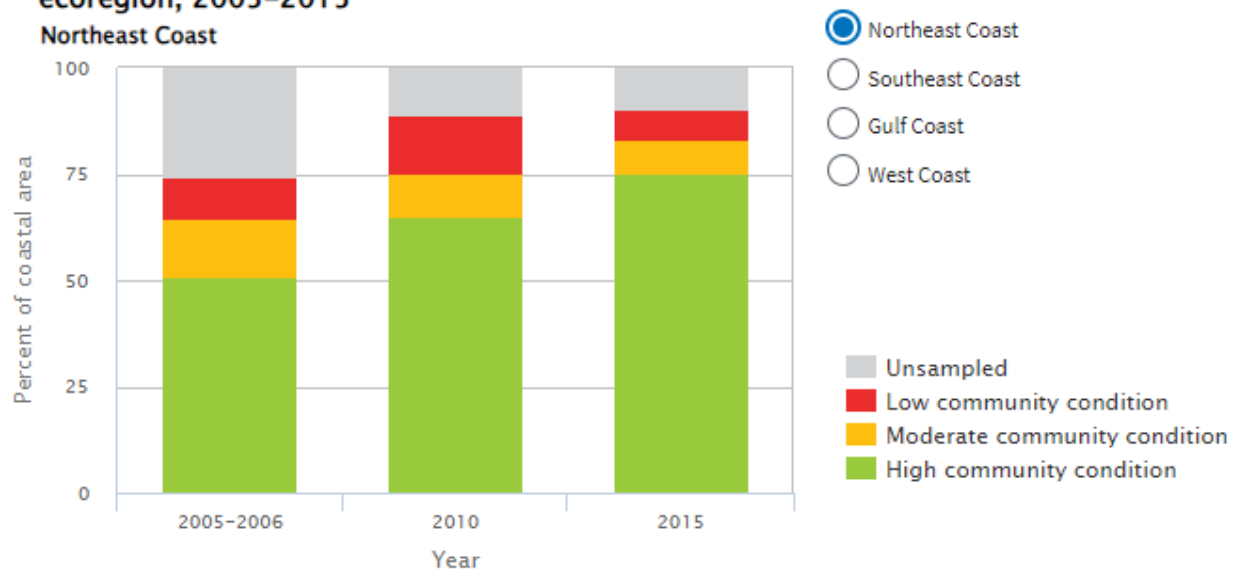
This indicator is based on an analysis published in EPA's National Coastal Condition Assessment Report (U.S. EPA, 2021). These data are available on EPA's website at <https://www.epa.gov/national-aquatic-resource-surveys/data-national-aquatic-resource-surveys>.

References

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Exhibit 1. Coastal benthic communities index for the contiguous U.S. by ecoregion, 2005–2015

Northeast Coast



See text for definitions of categories.

Analysis shows that the decrease in moderate community condition and increase in high community condition in Northeast coastal waters are statistically significant. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: U.S. EPA, 2021

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